## REMARKS

Claims 1, 3-5, 7-11, 13-19, 21, 23-27, and 30-33 are pending. The Applicants have previously canceled claims 6, 12, 22, 28, and 29 without prejudice. With this amendment, the Applicants have canceled claims 2 and 20 without prejudice.

The Office action dated September 12, 2005 ["Office action"], rejects claims 1, 5, 7-8, 18-19, 23, and 30-31 as being unpatentable over U.S. Patent No. 6,026,190 to Astle ["Astle"] in view of U.S. Patent No. 5,089,889 to Sugiyama ["Sugiyama"]. The Office action rejects claims 2-3, 9, 11, 13-16, 20, 24-26, and 32 as being unpatentable over the combination of Astle and Sugiyama in view of U.S. Patent No. 4,334,244 to Chan et al. ["Chan"] and Russ ("The Image Processing Handbook," 2nd ed., CRC Press, 1994, pp. 164-66) ["Russ"]. The Office action rejects claims 10 and 27 as being unpatentable over description of conventional lossy compression techniques at pages 2-3 of the application (which the Examiner terms "admitted prior art") in view of Astle, Sugiyama, Chan, and Russ. The Office action rejects claims 4 and 21 as being unpatentable over Astle, Sugiyama, Chan, and Russ in view of U.S. Patent No. 5,625,714 to Fukuda ["Fukuda"]. The Office action rejects claim 17 as being unpatentable over the combination of Astle, Sugiyama, Chan, and Russ, in view of U.S. Patent No. 5,969,764 to Sun et al. ["Sun"]. The Office action rejects claim 33 as being unpatentable over the combination of Astle, Sugiyama, Chan, and Russ in view of U.S. Patent No. 6,556,925 to Mori et al. ["Mori"].

### 1. Claim Objections

The Examiner objects to claim 31 because of an informality: the phrase "a a" occurs within the claim. In the rewritten claim only one "a" appears. Applicants respectfully request withdrawal of the objection.

### 2. In the interest of reaching a shared understanding of the disclosures of Astle, Sugiyama, Chan, and Russ, Applicants make the following observations.

a) Astle

Astle describes a video encoding process which captures a frame of video data, subsamples it to create a pixel array which is then broken up into (8 x 8) blocks. A

"[l]ow pass filter ... is then applied to each (8 x 8) block." [Astle, 5:45-46.] These blocks are then quantized and encoded. Therefore, every block has some portion of the high frequency component filtered out.

The filter in Astle is designed to work in tandem with the quantization of the blocks, and serves to decrease the visibility of quantization artifacts in the unencoded image. [Astle, 10:46-49.] One option for the filter described in Astle is "a non-linear weighted median filter. For example, one such filter examines the eight pixels surrounding the pixel to be filtered." [Astle, 10:59-60.]

b) Sugiyama

Sugiyama describes an apparatus for predictive inter-frame encoding. [Sugiyama, Abstract.] The Sugiyama apparatus filters the prediction error signal prior to the orthogonal transform, quantization, and encoding processing. [Sugiyama, Fig. 3, 9:23-27.] The filtering removes "part of the high frequency components of these prediction error values." [Sugiyama 9:47-49.] "[I]ndependent frames are not transferred through the spatial filter 3, so that the high frequency components of these frames are available to the decoding apparatus when the dependent frames are recovered ...." [Sugiyama 10:6-10.]

Furthermore, the filters in Sugiyama at least in part "serve to eliminate prediction error values which correspond to isolated very small regions or to thin lines in the spatial domain." [Sugiyama 12:3-5.]

Discrete and mutually independent horizontal and vertical filtering in Sugiyama "executes mutually independent processing in the vertical and horizontal direction of the frame." [Sugiyama 10:43-45.] "[E]ach median filter has a characteristic function such that for every three successive data samples (in this case, prediction error values) that are inputted thereto, only the one of these three which is intermediate in magnitude between the other two will be outputted from the filter." [Sugiyama 10:67-11:4.] The median filters in Sugiyama, therefore, are one-dimensional, and receive as a maximum three input values per filtering. The median filters are not designed to work in an isolated fashion, however. Rather, the median filter results are first multiplied by a weighting factor 1 - $\alpha$ and are then combined with the results of a separate low-pass filter, which is

also weighted. The weighting values of the two filters are related in that the weighting factor of the low-pass filter is equal to $\alpha$. [Sugiyama, 12:21-31.] These two specific filters are designed to produce specific results—they "eliminate prediction error values which correspond to isolated very small regions or to thin lines in the spatial domain." [Sugiyama, 12:3-8.] FIG. 7B shows that if two successive pixels have the same value, then "there is little attenuation produced by the low-pass filter in such a case, and no attenuation produced by the median filter." [Sugiyama, FIG. 7B, 11:67-12:2.]

Overall, "[t]he degree of the spatial filter is determined by a factor $\beta$." [Sugiyama, 12:32-33.]

c) Chan

Chan describes a system to enhance a video image by combining noise filtering and edge sharpening. [Chan, Abstract.] It does this in part by sampling a digital signal and then forming a gradient sample. To form the gradient sample, a median sample is generated using a median filter, and an average sample is generated using an average filter. The magnitude of the gradient sample is then determined by using the difference between the median and the average sample value. [Chan, Abstract, 3:24-3:56.]

Chan indicates "[t]he performance of the circuit depends largely on the size of the averaging and median filters." [Chan, 5:59-60.] Chan further indicates:

> Performance of the median filter depends on both the size and the shape of the block of pixels used. Increasing the number increases the noise filtering but produces a greater loss of spatial resolution. Five pixels arranged in a cross has been found to produce satisfactory results.

[Chan, 5:65-6:2.] In other words, Chan describes a tradeoff between noise filtering and spatial resolution for median filter size and shape, but Chan does not relate median filter size or shape to bit rate of the video. In fact, Chan does not involve video encoding at all, but rather is directed to image enhancement (e.g., by noise filtering and edge sharpening) regardless of bit rate concerns. Moreover, Chan describes a system that is configured to use a single size/shape of median filter (namely, a 5-pixel cross shape) for all median filtering, which leads away from adapting filter size and/or shape.

d) Russ

Russ describes various aspects of median filtering for still images. [Russ, 165-166.] Some techniques involve "ranking of the pixels in a neighborhood according to brightness. Then, for example, the median value in this ordered list can be used as the brightness value for the central pixel." [Russ at 165.] Five neighborhood patterns that can be used for median filtering are also described. [*Id.*] The median filters are used to remove shot noise. [Russ at 164, 165.] Specifically, Russ indicates median filtering is "an excellent rejector of certain kinds of noise" [Russ at 165] and is "preferred both for visual examination and measurement of images" [Russ at 166].

**3. Claims 1, 3, 5, 7-9, 11, 13-16, 18-20, 23-26, and 30-32 should be allowable.**

The Office action rejected claims 1, 5, 7, 8, 18, 19, 23, 30, and 31 as being unpatentable over Astle in view of Sugiyama. Although the Applicants disagree with the rejections of independent claims 1 and 18, the rejections are moot in view of the language added to claim 1 (from claim 2) and claim 18 (from claim 20). In the Office action, claims 2 and 20 were rejected as being unpatentable over the combination of Astle, Sugiyama, Chan, and Russ. Accordingly, in this section, the Applicants address claims 1, 3, 5, 7-9, 11, 13-16, 18-20, 23-26, and 30-32 relative to Astle, Sugiyama, Chan, and Russ.

**A. Astle, Sugiyama, Chan, and Russ, taken separately or in combination, fails to teach or suggest at least one limitation of each of claims 1, 9, 13, 18, and 24, respectively.**

Claim 1 now reads, in part:

wherein the adjusting comprises changing shape of the kernel based at least in part upon the indicator value.

Claim 9 reads, in part:

means for selecting a kernel for median filtering video information.

Claim 13 reads, in part:

intermittently changing a kernel for filtering the set of video information, wherein the kernel defines a neighborhood of values for the filtering, the kernel selected

from plural available kernels including at least a first kernel with a first kernel shape and a second kernel with a second kernel shape different than the first kernel shape, the first kernel for decreasing quality and bitrate, and the second kernel for preserving quality and increasing bitrate.

Claim 18 now reads, in part:

wherein the adjusting comprises changing shape of the kernel based at least in part upon the received bitrate indicator.

Claim 24 reads, in part:

wherein the bitrate adaptive filter adjusts filtering by changing shape of the kernel.

Astle, Sugiyama, Chan, and Russ, taken separately or in combination, fail to teach or suggest the above-cited language of claims 1, 9, 13, 18, and 24, respectively.

The Examiner asserts, and Applicants agree, that the combination of Astle and Sugiyama "does not teach explicitly the feature related to (1) 'changing the kernel of median filtering based upon the indicator value of the buffer' and (2) kernel shape." [Office action of September 12, 2005 at 7.] The Applicants further note that adjustment of median filtering results by a scalar strength value [*see* Astle, 10:55-11:28] or weighting factor [*see* Sugiyama, 12:21-52] leads directly away from "changing shape of the kernel" (claims 1, 18, and 24), "selecting a kernel" (claim 9), and "changing a kernel" (claim 13).

Chan and Russ also fail to teach or suggest the above-cited language of claims 1, 9, 13, 18, and 24, respectively. The Examiner states that Chan teaches "that the strength of a median filter depends on the size and shape of the median filter. [Office action of September 12, 2005 at 8.] The Applicants disagree with this characterization of Chan relative to claims 1, 9, 13, 18, and 24. Chan does not teach that the "strength" of a median filter depends on the size and shape of the median filter, but rather that "**performance** of the median filter depends on both the size and the shape of the block of pixels used." [Chan, 5:65-67, emphasis added.] Specifically, Chan relates median filter size and shape to noise filtering and spatial resolution. Chan does not relate median filter size or shape to bit rate of video, and in fact does not involve video encoding at all.

Similarly, Russ describes using median filtering for noise removal in visual examination and measurement of images. [Russ at 164-66.]

Furthermore, Chan describes a system that is configured to use a single size/shape of median filter (namely, a 5-pixel cross shape) for all median filtering, which leads away from the above-cited language of claims 1, 9, 13, 18, and 24, respectively. [Chan, Fig. 6, 6:1-20.] Chan indicates one specific filter shape "produce[s] satisfactory results." [Chan, 6:1-2.] Even if Chan describes median filtering, one of skill in the art reading Chan would only be motivated to choose one filter from Russ—the one that performs the best for the given situation for noise filtering and edge sharpening. This is not only different from, but also directly teaches away from, the above-quoted language of claims 1, 9, 13, 18, and 24, respectively.

For at least these reasons, claims 1, 9, 13, 18, and 24 should be allowable.

**B. The combination of Astle, Sugiyama, Chan, and Russ set forth by the Examiner is improper.**

The Examiner writes:

> It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply the combined teaching of Chan and Russ to add Russ's approach to include median filtering in which the kernel of median filtering is change in size and shape" as additional low-pass filtering in the method taught by the combination of Astle and Sugiyama because the combination of Astle, Sugiyama, Chan and Russ provides flexibility in bit rate control.
>
> Because the five median filters of Fig. 11 of Russ are discrete, it would have been obvious to one of ordinary skill in the art, at the time of the invention that each filter represents a discrete range of strength of filtering. Once the strength of filtering for bit rate control is determined in Astle, the type of filter (or no filtering) will be selected from Fig. 11 of Russ.

[Office Action, page 8.] The combination of Astle, Sugiyama, Chan, and Russ made by the Examiner in the Office action is improper for at least the following reasons.

First, Astle describes adjusting median filtering results by a scalar strength value [Astle, 10:55-11:28], and Sugiyama describes adjusting median filtering results by a weighting factor [Sugiyama, 12:21-52]. Adjusting median filtering results by a scalar

strength value (as in Astle) or weighting factor (as in Sugiyama) leads directly away from the modification of Astle and Sugiyama that the Examiner has made. It also changes a principle of operation of each of Astle and Sugiyama. [*See* MPEP 2143.01 VI, 2145 X.D.]

Second, Chan describes median filter size and shape as relating to noise filtering and spatial resolution, and Chan uses median filtering for image enhancement. [Chan, Abstract, 5:65-6:20.] Chan does not relate median filter size or shape to bit rate of video, and in fact does not involve video encoding at all. Similarly, Russ describes using median filtering for noise removal in visual examination and measurement of images, and Russ does not relate median filter size or shape to bit rate. [Russ at 164-66.] Using median filtering for noise filtering or image enhancement (as in Chan) or noise removal for visual examination/measurement (as in Russ) leads directly away from the modification of Astle and Sugiyama that the Examiner has made. It also changes a principle of operation of each of Astle and Sugiyama.

Third, Chan describes a system that is configured to use a single size/shape of median filter (namely, a 5-pixel cross shape) for all median filtering [Chan, 6:1-20]. Configuring a system to use a single size/shape of median filter for all median filtering (as in Chan) leads directly away from the modification of Astle and Sugiyama that the Examiner has made.

Fourth, even if Chan describes median filtering, one of skill in the art reading Chan would only be motivated to choose one filter from Russ—the one that performs the best for the given situation for noise filtering and edge sharpening. This further leads away from the modification of Astle and Sugiyama that the Examiner has made.

For at least these reasons, claims 1, 9, 13, 18, and 24 should be allowable.

### C. Dependent claims 3, 5, 7, 8, 11, 14-16, 19, 20, 23, 25, 26, and 30-32 should be allowable.

Dependent claims 3, 5, 7, 8, 11, 14-16, 19, 20, 23, 25, 26, and 30-32 incorporate language from their respective parent claims. For at least the reasons given above for claims 1, 9, 13, 18, and 24, respectively, dependent claims 3, 5, 7, 8, 11, 14-16, 19, 20, 23, 25, 26, and 30-32 should be allowable.

**4. Claims 10 and 27 should be allowable.**

In rejecting claims 10 and 27, the Examiner combines the Examiner's characterization of "the admitted prior art (pages 2-3)", Astle, Sugiyama, Chan, and Russ. [Office action of September 12, 2005 at 9 and 10.] The Applicants respectfully disagree.

Claims 10 and 27 incorporate the language of claims 9 and 24, respectively. As noted in section 3, Astle, Sugiyama, Chan, and Russ, taken separately or in combination, fail to teach or suggest at least one limitation of each of claims 9 and 24. The "admitted prior art" cited by the Examiner also fails to teach or suggest the above-cited language of claims 9 and 24, respectively. For at least this reason, claims 10 and 27 should be allowable.

Moreover, because the combination of Astle, Sugiyama, Chan, and Russ is improper (see section 3), the further combination of the Examiner's characterization of "the admitted prior art (pages 2-3)" [*Id.*] with Astle, Sugiyama, Chan, and Russ is also improper. For at least this reason, claims 10 and 27 should be allowable.

**5. Claims 4 and 21 should be allowable.**

In rejecting claims 4 and 21, the Examiner combines Astle, Sugiyama, Chan, Russ, and Fukuda. [Office action of September 12, 2005 at 11.] The Applicants respectfully disagree.

Claims 4 and 21 incorporate the language of claims 1 and 18, respectively. As noted in section 3, Astle, Sugiyama, Chan, and Russ, taken separately or in combination, fail to teach or suggest at least one limitation of each of claims 1 and 18. Fukuda also fails to teach or suggest the above-cited language of claims 1 and 18, respectively. For at least this reason, claims 4 and 21 should be allowable.

Moreover, because the combination of Astle, Sugiyama, Chan, and Russ is improper (see section 3), the combination of Astle, Sugiyama, Chan, Russ, and Fukuda is also improper. For at least this reason, claims 4 and 21 should be allowable.

**6. Claim 17 should be allowable.**

In rejecting claim 17, the Examiner combines Astle, Sugiyama, Chan, Russ, and Sun. [Office action of September 12, 2005 at 12.] The Applicants respectfully disagree.

Claim 17 incorporates the language of claim 13. As noted in section 3, Astle, Sugiyama, Chan, and Russ, taken separately or in combination, fail to teach or suggest at least one limitation of claim 13. Sun also fails to teach or suggest the above-cited language of claim 13. For at least this reason, claim 17 should be allowable.

Moreover, because the combination of Astle, Sugiyama, Chan, and Russ is improper (see section 3), the combination of Astle, Sugiyama, Chan, Russ, and Sun is also improper. For at least this reason, claim 17 should be allowable.

**7. Claim 33 should be allowable.**

In rejecting claim 33, the Examiner combines Astle, Sugiyama, Chan, Russ, and Mori. [Office action of September 12, 2005 at 12.] The Applicants respectfully disagree.

Claim 33 incorporates the language of claim 1. As noted in section 3, Astle, Sugiyama, Chan, and Russ, taken separately or in combination, fail to teach or suggest at least one limitation of claim 1. Mori also fails to teach or suggest the above-cited language of claim 1. For at least this reason, claim 33 should be allowable.

Moreover, because the combination of Astle, Sugiyama, Chan, and Russ is improper (see section 3), the combination of Astle, Sugiyama, Chan, Russ, and Mori is also improper. For at least this reason, claim 33 should be allowable.

## CONCLUSION

Claims 1, 3-5, 7-11, 13-19, 21, 23-27, and 30-33 should be allowable. Such action is respectfully requested.

## REQUEST FOR AN INTERVIEW

If the Examiner finds that the amendment does not make the application allowable over the cited art, the Examiner is formally requested to contact the undersigned patent agent at (503) 595-8560 prior to the issuance of the next communication to arrange a telephonic interview. It is believed that a brief discussion of the merits of the present

application will allow the application to be passed to issue. Applicants submit the foregoing remarks so that the Examiner may fully evaluate Applicants' position, thereby enabling the interview to be more productive.

This request is being submitted under MPEP § 713.01, which indicates that an interview my be arranged in advance by a written request.

Respectfully submitted,

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